

66. (new) The memory element of claim 61, wherein said programmable resistance material includes a chalcogen element.

Remarks

The Office Action is discussed in detail below. Support for amendment to claim 21 is on page 29, lines 18-23 as well as from Figure 13 of the specification as filed. Claim 22 has been amended to remove the second "of" (grammatically incorrect). No new matter has been added.

Claim Rejections - 103(a)

Claims 21-24 and 26-27 are rejected under 35 USC 103(a) as being unpatentable over Wolstenhome in view of Batra.

Amended claim 21 is recited below:

21. An electrically programmable memory element, comprising:
a substrate;
a first dielectric layer formed over said substrate;
a first conductive layer formed over said first dielectric layer and in electrical communication with said substrate;
a second dielectric layer formed over said first conductive layer, said second dielectric layer having an opening therethrough;
a spacer disposed about a peripheral portion of said opening to form a pore, said pore overlying said first dielectric layer;
a programmable resistance material disposed within said pore and in electrical communication with said first conductive layer; and

a second conductive layer in electrical communication with said programmable resistance material.

Wolstenholme

Figure 6 of Wolstenholme shows a first dielectric layer 15, a first conductive layer 22, the second dielectric layer 45 having a pore 50 therein, a chalcogenide material 155 disposed within the pore 50.

However, Wolstenholme provides no teaching or suggestion of applicant's limitations:

(A) "...a spacer disposed about a peripheral portion of said opening to form a pore..." or

(B) "...said pore overlying said first dielectric layer..." (referring to Figure 6, it is seen that pore 50 is not overlying dielectric layer 15).

Hence, Wolstenhome alone does not teach or suggest all of the limitations of applicant's claim 21.

Batra

Batra is directed to a method of making an SRAM cell. Referring to Figure 9 of Batra, it is seen that Batra teaches the use of sidewall spacer 68 formed about the periphery of opening 62 to form a smaller opening 72. Batra teaches (see column 6, lines 55-63) that the smaller opening 72 is filled with a material to form a pull-up resistor 34 for an SRAM cell. The pull-up resistor 34 is formed of a fixed resistance material and not a programmable resistance material.

Barta, like Wolstenhome, fails to provide any teaching or suggestion of a pore, that includes a programmable resistance material, overlying a dielectric material.

The combination of Barta and Wolstenhome thus fails to teach or suggest all of the limitations of applicant's invention as recited in claim 21.

Hence, in view of the amendment to claim 21 and the above remarks, the rejection of claims 21-27 under 35 USC 103(a) as being unpatentable over Wolstenhome in view of Batra and/or Wolstenhome in view of Batra and Tanashashi is overcome and applicant requests the rejections be removed.

Analysis of New claims 61-66 with respect to cited references:

Claim 61 recites:

61. An electrically operated memory element comprising:
 - a substrate;
 - a first dielectric layer formed over said substrate, said first dielectric layer having an opening therethrough;
 - a first conductive layer lining the sidewall surface of the opening of said first dielectric layer, said first conductive layer in electrical communication with said substrate;
 - a second dielectric layer disposed on said conductive material within said opening;
 - a second conductive layer formed over a top surface of said first conductive layer and a top surface of said second dielectric layer;
 - a third dielectric layer formed over said second conductive layer, said third dielectric layer having a pore therethrough to said second conductive layer, said pore overlying said second dielectric layer; and

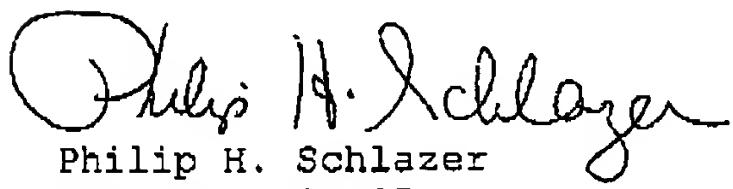
a programmable resistance material disposed in said pore and in electrical communication with said second conductive layer.

The references cited in the Office Action of April 21, 2004 are Wolstenholme (US 5,998,244), Batra (US 6,242,781) and Tanahashi (US 6,064,084). Neither Wolstenhome, Batra or Tanahashi, either alone or in combination, teach or suggest a pore, including a programmable resistance material, overlying a dielectric material as recited in claim 61. Hence, the combination of Wolstenhome, Batra and Tanashashi fail to teach or suggest all of the limitations of claim 61. The combination of Wolstenhome, Batra and Tanashashi is thus insufficient for a prima facie case of obviousness over applicant's claims 61-66.

SUMMARY

Claims 60 has been canceled. Claim 21 has been amended. Claims 61-66 has been added. In view of the above amendments and remarks, claims 21-27 and new claims 61-65 are in condition for allowance. Applicant respectfully requests withdrawal of the outstanding objections and rejection, and notification of allowance. Should the Examiner have any questions or suggestions regarding the prosecution of this application, he is asked to contact applicant's representative at the telephone number listed below.

Respectfully submitted,



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